GUIDE G-4

ERCB

Determining Water Production at Gas Wells

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ENERGY RESOURCES CONSERVATION BOARD
GUIDE SERIES

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CONTENTS

1 INTRODUCTION

The purpose of this guide is to clarify the Energy Resources Conservation Board's policies and regulations concerning the determination of water production from gas wells. The guide defines the different forms of water production and outlines the methods for determining the total production rate. It specifies criteria for conducting water-gas ratio tests. Sample calculations and the required reporting procedures are also provided.

2 DETERMINING TOTAL WATER PRODUCTION AT GAS WELLS

2.1 GENERAL

Alberta's natural gas reserves are trapped within water-wet reservoirs. As a result, the gas is fully saturated with water vapour, and a portion of the reservoir rock pore volume is occupied by liquid formation water. Equilibrium exists between the vapour and liquid water phases at reservoir pressure and temperature. When production occurs from the reservoir, the water vapour and some of the liquid formation water are produced along with the gas. However, since wellbore and separator temperatures and pressures are different from those in the reservoir, phase changes can occur. Water vapour may remain as a vapour or it may condense. Liquid formation water may remain as a liquid or it may vaporize.

The Energy Resources Conservation Board requires that water production from oil and gas wells be reported. The Board is concerned that when gas wells produce excessive water, the reserve recovery may be affected. It believes that in order to maintain an effective surveillance to identify pools which might be subject to water production problems, the reporting of well water production must be accurate. The ERCB and operators may then be aware of trends in well performance and would provide the opportunity to take measures to control and

avert excessive water production before irreversible damage is done to the producing formation around the wellbore. Board staff are prepared to discuss with individual operators those areas of particular concern where an improvement in the accuracy of reported monthly water production volumes is needed.

2.2 DEFINITIONS

Water, produced in conjunction with gas, can be categorized as follows:

- **Water Vapour** — This is water that exists in the vapour phase with the gas. All or part of this water vapour may have existed in a vapour phase in the reservoir. Some may have been formation water that was vapourized due to a change in the saturation conditions of the gas (pressure, temperature).

- **Water of Condensation** — This is liquid water that results when water vapour in a gas condenses as saturation conditions of the gas change. Condensed water contains little or no dissolved solids.

- **Formation Water** — This is water that normally contains dissolved solids and is in the liquid phase at both reservoir and separator conditions.

2.3 WATER PRODUCTION REPORTING

All liquid water production, whether it be water of condensation or formation water, is considered production and must be reported on

the Board's monthly well production report (S-1 form) in the manner described in chapter S-1, section 120, of the Board's Production Accounting Handbook. A copy of this section appears in the appendix of this guide. It outlines the three basic methods that are applicable.

WATER PRODUCTION TESTING

Water production rate testing for gas wells is to be conducted after every six months of gas production from a well, and the date of this test recorded on the S-1 report.

A reduction in this test frequency may be obtained in certain instances if it can be shown that the producing formation is not particularly sensitive to excessive water production.

Applications for reduced test frequency are to be submitted to the Board's Development Department and should include the following:

- The reasons why reduced testing is warranted.
- A discussion of the testing method currently used and to be used to determine water production.
- An evaluation of the susceptibility of the producing formation to water damage and any impact on ultimate recovery.

2.4 WATER SAMPLING

To determine if the liquid water production is formation water or water of condensation, a representative sample shall be taken from a suitable location and analysed for total dissolved solids (TDS).

If the TDS content is less than 4000 ppm, the water is considered water of condensation; if the TDS is 4000 ppm or greater, it is formation water. Samples may be taken by the operator to select the method to be used for determining water production. The methods are explained in section 2.5.

Where it has been determined that a well is producing only water of condensation, a letter is to be filed with the Board's Development Department indicating this. Further analysis of well water production is to be conducted after every six months of gas production to verify that the water produced still meets the criteria for water of condensation. These analyses need not be submitted to the Board but must be kept on file. The date of the analysis is used as the test date reported on the S-1 report.

2.5 METHODS FOR DETERMINING WATER PRODUCTION

o Method 1 — Water of Condensation

Where it has been established that a well is producing only water of condensation, the "Dew Point of Natural Gas" curves may be used for estimating water production (see Figures 2, 3, and 4, and the sample calculations). The water rates determined by this method must be reviewed after every six months of production.

There are a number of methods for calculating the water content of a natural gas. The recommended method, used here for the sample calculations, employs the curves developed by McKetta and Wehe (Figure 2 for sweet gas), and those developed by Campbell (Figures 3 and 4 for sour gas). These curves show the water-vapour content of natural gas in units of mg H_2O/m^3 gas.

To convert to m^3 $H_2O/10^3$ m^3 (for production reports) multiply by 10^{-6}.

SAMPLE CALCULATION - METHOD 1 WATER OF CONDENSATION

Determine the water of condensation

Reservoir Temperature - 55°C
Reservoir Pressure - 10 342 kPa (1500 psia)*
Separator Temperature - 25°C
Separator Pressure - 4137 kPa (600 psia)*
Gas Composition - HC - 73 mole per cent
- H_2S - 20 mole per cent
- CO_2 - 7 mole per cent

Liquid water production = water of condensation

Step 1 Using Figures 2, 3, and 4 determine the amount of water present in the gas at reservoir conditions for each component in the gas stream:

Component	Mole %	Wc Gas	Partial Wc Gas
		mg H_2O/m^3	mg H_2O/m^3
HC (Fig 2)	73	1630	1190
H_2S (Fig 3)	20	4300	860
CO_2 (Fig 4)	7	2500	175
			2225

This is equivalent to 0.002 225 m^3 $H_2O/10^3$ m^3 gas.

Step 2 Determine the Wc at separator conditions:

Component	Mole %	Wc Gas	Partial Wc Gas
		mg H_2O/m^3	mg H_2O/m^3
HC	73	670	489
H_2S	20	1530	306
CO_2	7	700	49
			844

This is equivalent to 0.000 844 m^3 $H_2O/10^3$ m^3 gas.

* Conversion factor: 1 psi = 6.894 757 kPa.

Step 3 — Compare water content between reservoir and separator conditions:

The difference between the water-vapour content of the gas at reservoir and separator conditions is the water of condensation (0.001 381 m^3 $H_2O/10^3$ m^3 gas).

The water-gas ratio used to report production is 0.001 381 m^3 $H_2O/10^3$ m^3 gas. (Refer to Method 1 in Appendix.)

o Method 2 — No Permanent Water Measurement

This method is used where formation water is being produced but where there are no permanent water metering facilities. In these circumstances, a water rate test must be conducted to determine a water to gas ratio.

See section 3 for testing considerations and refer to Figure 1 for a typical test-unit hook-up. This method may also be used for wells producing water of condensation.

o Method 3 CONTINUOUS WATER MEASUREMENT

This method is used where permanent separation and water measurement facilities are in operation. Water measurement may be by use of a water meter or by tank gauging. If a water meter is used it must be calibrated once per year.

(Refer to Method 3 in Appendix.)

3 TESTING CONSIDERATIONS

Water rate tests may be conducted in one of two ways depending on whether or not permanent separation facilities are installed. The duration of the test is to be adjusted for a representative flow rate. This test duration must be a minimum of 12 hours.

A. If separation facilities are installed for the well but there are no provisions for water measurement, a water rate test may be conducted by collecting, in a suitable container, the water production from the separator. The volume of water produced divided by the gas production during this time period gives the water-gas ratio to be used when reporting production to the ERCB.

B. If there are no permanent separation facilities installed a portable test separator is to be used to obtain the water-gas ratio. The following items must be taken into consideration when conducting these tests.

- The valving manifold for connecting the portable test unit must be downstream of the wellhead effluent meter so that the normal flow regime is not disturbed (see Figure 1 of the guide).

- An effluent-meter correction factor must always be calculated during the test (separator gas measurement plus gas equivalent of liquid hydrocarbons, divided by effluent gas measurement).

- Water and condensate samples must be taken during every semi-annual test. The water must be analysed for total dissolved solids (TDS), and the condensate sample (hydrocarbons) must be analysed to determine an updated "gas equivalent".

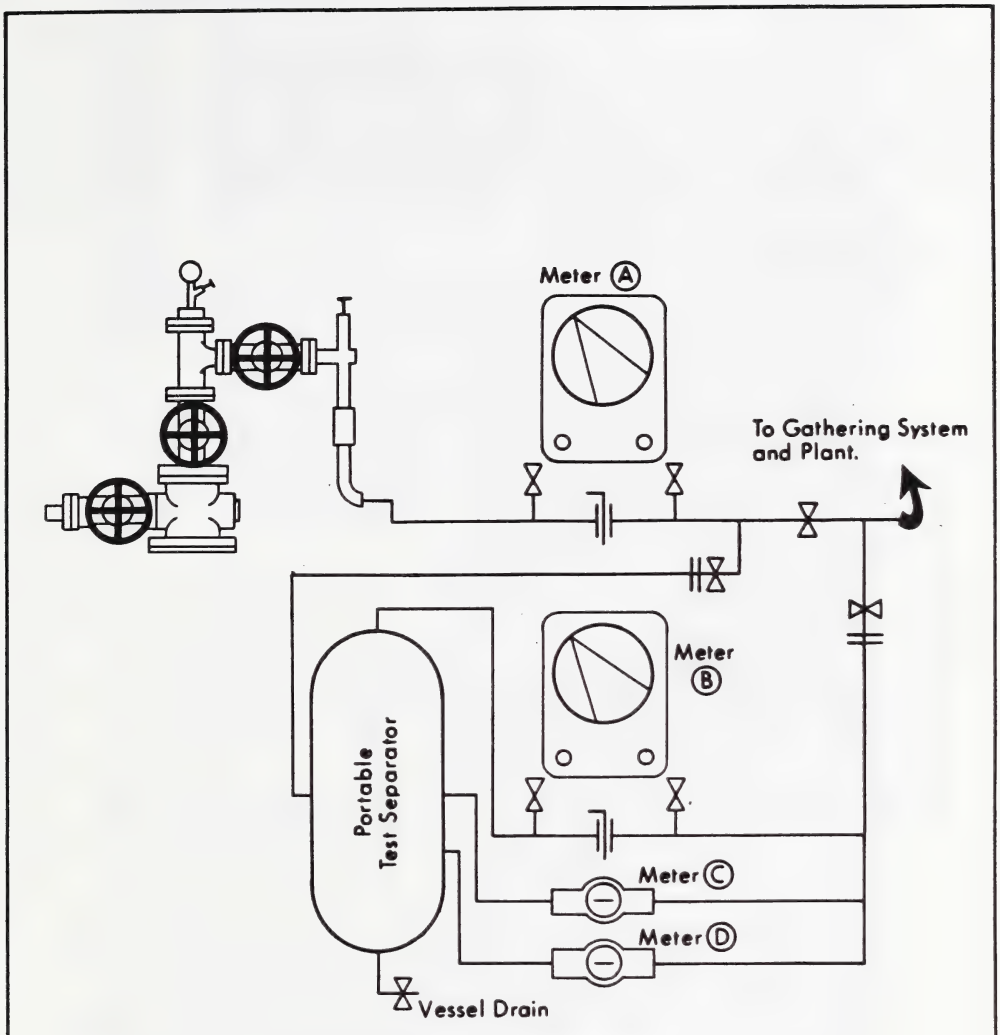
- The test duration must be based on the well's production characteristics. For example, a well that is slugging water must have a testing period of sufficient length so that the water production is representative of the well's flow characteristics.

- The testing procedure for consecutive tests must be consistent in order to identify when a change in a well's flow characteristics has occurred. Corrective action may then be taken before water coning occurs.

- The test must be conducted at normal operating conditions.

- The total gas volume must include the gas equivalent of any condensate that is produced during the testing period.

- The H_2S safety hazard usually encountered while testing sour gas wells can be avoided by recombining in a closed system the water, condensate, and dry gas downstream of the portable test separator.



Meter	A	Wellhead Effluent Measurement.
Meter	B	Test Gas Measurement.
Meter	C	Test Condensate Measurement, Converted to Gas Equivalent.
Meter	D	Test Water Measurement

Effluent Meter Correction Factor= $\frac{B+C}{A}$

FIGURE 1 TYPICAL PORTABLE TEST–UNIT HOOK–UP

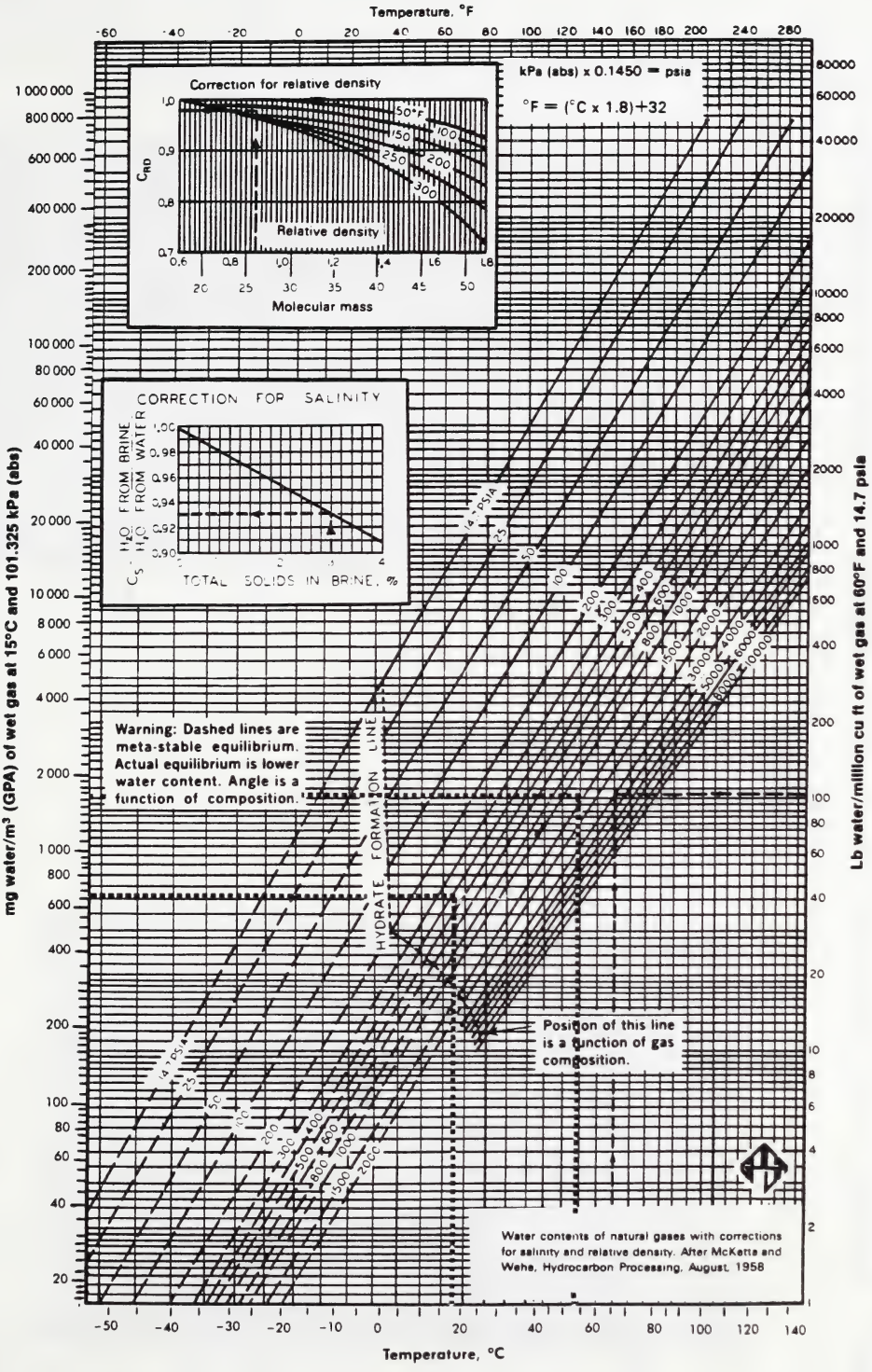


FIGURE 2 DEW POINT OF NATURAL GAS
(From GPSA Data Book)

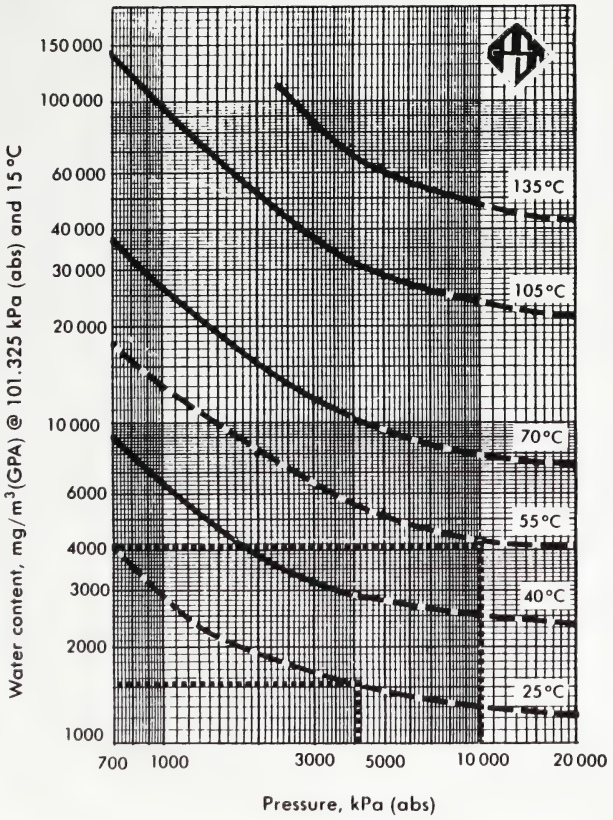


FIGURE 3 EFFECTIVE WATER CONTENT OF SATURATED H_2S IN NATURAL GAS (From GPSA Data Book)

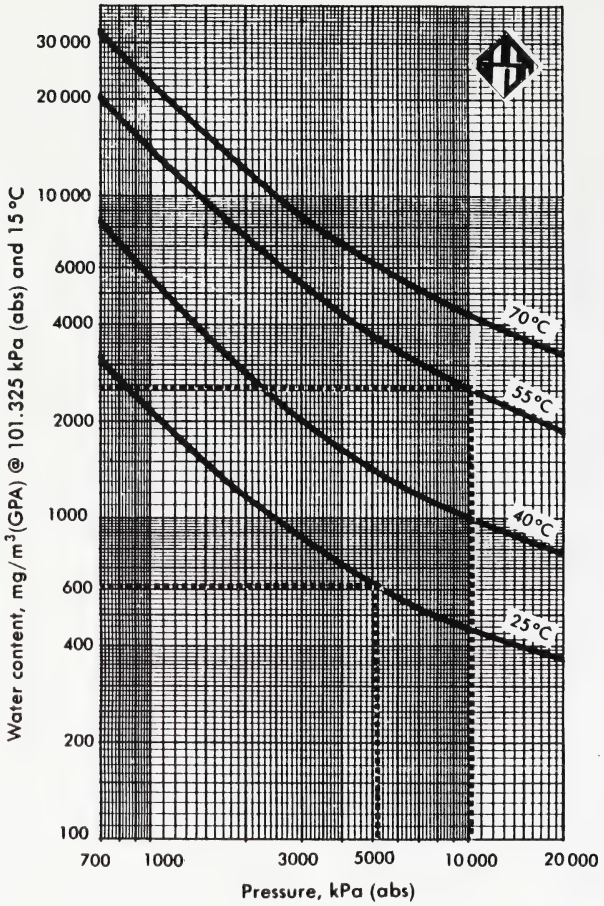


FIGURE 4 EFFECTIVE WATER CONTENT OF SATURATED CO_2 IN NATURAL GAS (From GPSA Data Book)

APPENDIX - DOCUMENTATION OF WATER PRODUCTION ON THE S-1 REPORT

This is a copy of Chapter S-1, Section 120, of the Energy Resources Conservation Board's Guide G-7 Production Accounting Handbook. This section details the reporting of water production on the S-1 form.

Case 1

Well gas production must first be calculated and entered according to a method described in Section 110 of this chapter.

WATER - GAS RATIO GAS - OIL RATIO
use this area

WATER OF CONDENSATION ONLY.

The water-gas ratio is to be calculated by the method described in ERCB Guide G-4, Determining Water Production at Gas Wells.

- calculate to 6 decimal places, then round to 5

Well water production
= water-gas ratio
x well gas production

Enter water production adjacent to gas production (same line).

WGR TEST DATE		
YEAR	MONTH	DAY

If wells are not production tested, the date of the last water analysis must be entered as the test date for each well.

These analyses are to be updated every 6 months.

WATER PRODUCTION CALCULATION EXAMPLE

CASE 1 Well producing water of condensation; No formation water

ERCB Energy Resources Conservation Board Calgary Alta T2P 3G4

NAME & ADDRESS OF OPERATOR

ENERGY RESOURCES VENTURES LTD.
640 FIFTH AVENUE SW
CALGARY, ALBERTA T2P 3G4

MONTHLY PRODUCTION STATEMENT

PROVINCE OF ALBERTA

GAS VOLUMES IN $10^3 m^3$ @ 101.325 kPa AND 15°C
LIQUID VOLUMES IN m^3 @ 101.325 kPa AND 15°C
ASSIGNED AREAS FOR VOLUMETRIC DATA ARE DEEMED TO BE REPORTED AS 100 PERCENT

YEAR	MONTH	OPERATOR	PROD AREA	BATTERY	AMENDMENT YEAR	AMENDMENT MONTH	AMENDMENT DAY	AMENDMENT CODE	PAGE
89	05	338		0060003					1 OF 1

ERCB BATTERY NAME: ERCB CESSFORD 7-15-23-12

WELL IDENTIFIER

WELL NAME	BOTTOM HOLE LOCATION	UNIT	B	NTS MAP	P	ES	HORIZON POOL	DEPOSIT	WGR TEST DATE YEAR MONTH DAY	WELL AUTHOR NUMBER	HOURS PRODUCED	NO OF TESTS	CRUDE OIL BITUMEN m^3	CONDENSATE m^3	GAS $10^3 m^3$	WATER m^3	CREDITS	PARTICIPATION INTEREST	PRODUCTION ALLOCATION m^3	ROYALTY m^3
ERCB CESSFORD 7-15-23-12	5 00 07 15 023 12 W 4 P 0								88 12 05		744	U			1448.4	2.0	GAS			
	LOAD OIL INJECTED OR OIL OR BIT ESTIMATE	LOAD OIL RECOVERED GAS ESTIMATE		LOAD OIL INVENTORY WATER ESTIMATE		WATER GAS RATIO GAS OIL RATIO		CYCLE NUMBER	0.00138	P							WATER			
												U								
												P								
												U								
												P								
												U								
												P								
												U								
												P								

TOTAL CRUDE OIL BITUMEN ESTIMATE	TOTAL GAS ESTIMATE	TOTAL WATER ESTIMATE	TOTAL OIL INJECTED	TOTAL OIL RECOVERED

PRORATION FACTORS

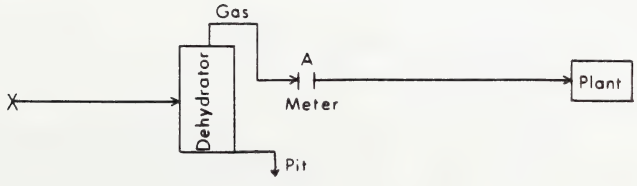
CRUDE OIL BITUMEN	GAS	WATER

TOTAL MEASURED PRODUCTION	1448.4	2.0
TOTAL PRORATED PRODUCTION		
TOTAL BATTERY PRODUCTION		

TOTAL CREDITS	GAS ROYALTY RATE	TOTAL PRODUCTION ALLOCATION	TOTAL ROYALTY
G			
W			

CONTACT NAME: J DOE — AREA TELEPHONE: 403-297-8311
SIGNATURE: J Smith — DATE: 9 JUNE 1989

S-1-88-05



Water-gas ratio based on calculations ; semi-annual update.
(NGPSA date book)

Case 2

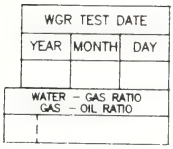
Well gas production must first be calculated and entered according to a method described in Section 110 of this chapter.

SEMI-ANNUAL TEST OF WATER PRODUCTION.

Estimated well water production based on a semi-annual production test of the well.

Well water production
= water-gas ratio
x well gas production

Enter estimated water production adjacent to gas production (same line).



The date of the last water rate test and the water-gas ratio must be entered for each well.

For systems with more than one well, water production must be prorated from the group measurement point (see proration details, pages 8-12 of this section).

WATER PRODUCTION CALCULATION EXAMPLE

CASE 2 Non-continuous water measurement

ERCB Energy Resources Conservation Board Calgary, Alta T2P 3G4

NAME & ADDRESS OF OPERATOR

ENERGY RESOURCES VENTURES LTD.
640 FIFTH AVENUE S.W.
CALGARY, ALBERTA T2P 3G4

MONTHLY PRODUCTION STATEMENT

PROVINCE OF ALBERTA

GAS VOLUMES IN 10^3m^3 @ 101.325 kPa AND 15°C
LIQUID VOLUMES IN m^3 @ 101.325 kPa AND 15°C
ASSIGNED AREAS FOR VOLUMETRIC DATA ARE DEEMED TO BE REPORTED AS BOE IF LEFT BLANK

YEAR	MONTH	OPERATOR	PROD. AREA	BATTERY	AMENDMENT YEAR	AMENDMENT MONTH	AMENDMENT DAY	AMENDMENT CODE	PAGE
89	05	338		20160003					1 of 1

BATTERY NAME: ERCB CESSFORD 11-28-23-12

WELL IDENTIFIER: ERCB CESSFORD 11-28-23-12

WELL NAME	HOURS PRODUCED	NO. OF TESTS	CRUDE BITUMEN	CONDENSATE	GAS	WATER	CREDITS	PARTICIPATION INTEREST	PRODUCTION ALLOCATION	ROYALTY
ERCB CESSFORD 11-28-23-12	744				1005.8	41.5	GAS			
							WATER			

WELL IDENTIFIER: 00 11 28 023 12 W4 0 0242000

WGR TEST DATE: 89 01 21

WATER GAS RATIO: 0.04126

TOTAL CRUDE OIL/BITUMEN ESTIMATE	TOTAL GAS ESTIMATE	TOTAL WATER ESTIMATE	TOTAL OIL INJECTED	TOTAL OIL RECOVERED

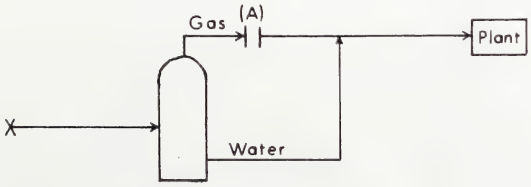
PRORATION FACTORS		
CRUDE OIL/BITUMEN	GAS	WATER

	CRUDE BITUMEN	CONDENSATE	GAS	WATER
TOTAL MEASURED PRODUCTION			1005.8	41.5
TOTAL PRORATED PRODUCTION				
TOTAL BATTERY PRODUCTION				

TOTAL CREDITS	GAS ROYALTY RATE	TOTAL PRODUCTION ALLOCATION	TOTAL ROYALTY

CONTACT NAME: J DOE
SIGNATURE: J Smith
AREA TELEPHONE: 403-297-83.11
DATE: 9 JUNE 1989

S-1-88-05



Water-gas ratio based on semi-annual test

$0.04126 \times 1005.8\ 10^3m^3 = 41.5\ m^3$

Case 3

MEASURED WATER PRODUCTION.

Enter well water production as measured water production.

WGR TEST DATE		
YEAR	MONTH	DAY

Enter the test date as the first day of each month when there is continuous water measurement.

WATER PRODUCTION CALCULATION EXAMPLE

CASE 3 Continuous water measurement

ERCB Energy Resources Conservation Board 640 Fifth Avenue SW Calgary Alta T2P 3G4

NAME & ADDRESS OF OPERATOR

ENERGY RESOURCES VENTURES LTD.
640 FIFTH AVENUE S.W.
CALGARY, ALBERTA T2P 3G4

MONTHLY PRODUCTION STATEMENT

PROVINCE OF ALBERTA

GAS VOLUMES IN $10^3 m^3$ @ 101.325 kPa AND 15°C
LIQUID VOLUMES IN m^3 @ 101.325 kPa AND 15°C
ASSIGNED AREAS FOR VOLUMETRIC DATA ARE DESMED
TO BE REPORTED AS O.C.F. LIFT BLANK

YEAR	MONTH	OPERATOR	FIELD AREA	BATTERY	AMENDMENT YEAR	AMENDMENT MONTH	AMENDMENT DAY	AMENDMENT CODE	PAGE
89	05	338		20160003					1 of 1

BATTERY NAME: ERCB CESSFORD 7-26-23-12

WELL IDENTIFIER

WELL NAME	BC	S	LE	UNIT	B	NTS MAP	P	ES	HORIZON POOL / DEPOSIT	WGR TEST DATE YEAR	MONTH	DAY	WELL AUTHOR NUMBER	HOURS PRODUCED	NO OF TESTS	CRUDE OIL / BITUMEN m^3	CONDENSATE m^3	GAS $10^3 m^3$	WATER m^3	CROWN ROYALTY CREDITS	PARTICIPATION INTEREST	PRODUCTION ALLOCATION m^3	ROYALTY m^3
ERCB CESSFORD 7-26-23-12	A/S	S	LE	LSD	SEC	TWP	RGE	W	M	P	ES										GAS			
		S	00	07	26	023	12	W	4	P	0	0242001	89	05	01	M 744	M			1304.5	63.6	WATER			

WELL NAME	LOAD OIL INJECTED OR OIL / CR BIT ESTIMATE	LOAD OIL RECOVERED GAS ESTIMATE	LOAD OIL INVENTORY WATER ESTIMATE	WATER - GAS RATIO GAS - OIL RATIO	CYCLE NUMBER
ERCB CESSFORD 7-26-23-12					

TOTAL CRUDE OIL/BITUMEN ESTIMATE	TOTAL GAS ESTIMATE	TOTAL WATER ESTIMATE	TOTAL OIL INJECTED	TOTAL OIL RECOVERED

PRORATION FACTORS

CRUDE OIL/BITUMEN	GAS	WATER

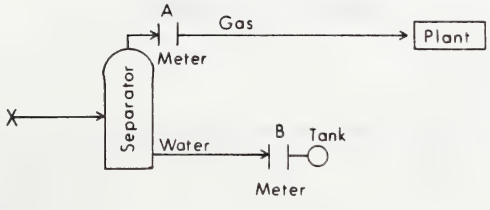
	CRUDE OIL / BITUMEN m^3	CONDENSATE m^3	GAS $10^3 m^3$	WATER m^3
TOTAL MEASURED PRODUCTION			1304.5	63.6
TOTAL PRORATED PRODUCTION				
TOTAL BATTERY PRODUCTION				

TOTAL CREDITS	GAS ROYALTY RATE	TOTAL PRODUCTION ALLOCATION	TOTAL ROYALTY
G			
W			

CONTACT NAME: J. DOE — AREA: 403 — TELEPHONE: 297-8311

SIGNATURE: J. Smith — DATE: 9 JUNE 1989

D 1 88-05



EXAMPLE OF PRORATING WATER PRODUCTION

First enter well gas production. Determine the water-gas ratio for estimated water production in accordance with ERCB Guide G-4, Determining Water Production at Gas Wells.

WGR TEST DATE		
YEAR	MONTH	DAY

DATE OF WATER RATE TEST.

- enter date of water rate test

WATER – GAS RATIO GAS – OIL RATIO
use this area

WATER-GAS RATIO.

- enter water-gas ratio determined from well test
- calculate to 6 decimal places, then round to 5

TOTAL PRORATED PRODUCTION	

MEASURED TOTAL CUBIC METRES (m^3) OF WATER PRODUCED AT BATTERY DURING MONTH WHICH IS TO BE PRORATED TO WELLS.

- round to 1 decimal place

WATER PRODUCTION CALCULATION EXAMPLE. Procedure when prorating water production

ERCB Energy Resources Conservation Board 640 Fifth Avenue SW Calgary Alta T2P 3G4

NAME & ADDRESS OF OPERATOR
ENERGY RESOURCES VENTURES LTD.
640 FIFTH AVENUE S.W.
CALGARY, ALBERTA T2P 3G4

MONTHLY PRODUCTION STATEMENT
PROVINCE OF ALBERTA
GAS VOLUMES IN $10^3 m^3$ @ 101.325 kPa AND 15 C
LIQUID VOLUMES IN m^3 @ 101.325 kPa AND 15 C
ASSOCIATED AREAS FOR VOLUMETRIC DATA ARE DEEMED
TO BE REPORTED AS 0.0 IF LEFT BLANK

YEAR	MONTH	OPERATOR	FIELD / AREA	BATTERY	AMENDMENT YEAR	AMENDMENT MONTH	AMENDMENT DAY	AMENDMENT CODE	PAGE
89	05	338		3200001					1 of 1

ERCB EDSON GAS FACILITY NO. 1
BATTERY NAME

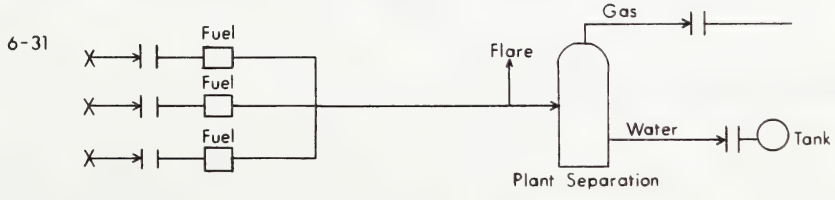
CROWN ROYALTY

WELL NAME	WELL IDENTIFIER	WGR TEST DATE	HOURS PRODUCED	NO OF TESTS	CRUDE OIL / BITUMEN m³	CONDENSATE m³	GAS $10^3 m^3$	WATER m³	CREDITS	PARTICIPATION INTEREST	PRODUCTION ALLOCATION	ROYALTY
ERCB EDSON 6-31-53-17	00 06 31 053 17 W5 0 0326001	89 02 15	720				1603.6	29.7	GAS			
	LOAD OIL INJECTED / OIL OR BIT ESTIMATE:	LOAD OIL RECOVERED / GAS ESTIMATE:	LOAD OIL INVENTORY / WATER ESTIMATE:	WATER - GAS RATIO / GAS - OIL RATIO: 0.01786	CYCLE NUMBER:				WATER			
ERCB EDSON 7-20-53-17	00 07 20 053 17 W5 0 0326001	89 02 15	720				1210.1	12.8	GAS			
				0.01015					WATER			
ERCB EDSON 11-25-53-18	00 11 25 053 18 W5 0 0326001	89 02 15	720				2109.9	25.9	GAS			
				0.01183					WATER			
									GAS			
									WATER			
									GAS			
									WATER			

TOTAL CRUDE OIL/BITUMEN ESTIMATE	TOTAL GAS ESTIMATE	TOTAL WATER ESTIMATE	TOTAL OIL INJECTED	TOTAL OIL RECOVERED	TOTAL MEASURED PRODUCTION	TOTAL CREDITS	GAS ROYALTY RATE	TOTAL PRODUCTION ALLOCATION	TOTAL ROYALTY
	4930.8	65.9				G			
PRORATION FACTORS					TOTAL PRORATED PRODUCTION 4923.6	68.4			
CRUDE OIL/BITUMEN	GAS	WATER			TOTAL BATTERY PRODUCTION	W			
	0.99854	1.03794							

PLANT INLET GAS	4733.2
GAS EQUIVALENT OF CONDENSATE	134.0
GAS USED ON LEASE OR FLARED UPSTREAM OF PLANT INLET	56.4
	4923.6

CONTACT NAME: J. DOE — AREA / TELEPHONE: 403 297-8311
SIGNATURE: J. Smith — DATE: 9 JUNE 1989



Calculation of water-gas ratio from test data. ERCB Cessford 6-31-53-17
Test production at pressure and temperature of separator.

Gas 50.4 $10^3 m^3$
Water 0.9 m^3

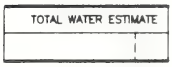
$$\text{Water-gas ratio} = \frac{0.9}{50.4} = 0.017\ 86$$

Estimated water production $0.017\ 86 \times 1603.6 = 28.6\ m^3$

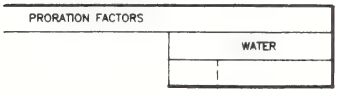
Calculation of water estimate

WATER ESTIMATE FOR WELL (m^3)
= WATER-GAS RATIO
x WELL GAS PRODUCTION.

- round to 1 decimal place



SUM OF WATER ESTIMATE FOR ALL WELLS IN BATTERY.



WATER PRORATION FACTOR
= TOTAL PRORATED WATER PRODUCTION
÷ TOTAL ESTIMATED WATER PRODUCTION.

- calculate to 6 decimal places, then round to 5

WATER PRODUCTION CALCULATION EXAMPLE

ERCB Energy Resources Conservation Board 640 Fifth Avenue SW Calgary Alta T2P 3G4

NAME & ADDRESS OF OPERATOR

ENERGY RESOURCES VENTURES LTD.
640 FIFTH AVENUE S.W.
CALGARY, ALBERTA T2P 3G4

MONTHLY PRODUCTION STATEMENT

PROVINCE OF ALBERTA

GAS VOLUMES IN $10^3 m^3$ @ 101.325 kPa AND 15°C
LIQUID VOLUMES IN m^3 @ 101.325 kPa AND 15°C
ASSIGNED (PEAK) PRODUCTION VOLUMETRIC DATA ARE DEEMED TO BE REPORTED AS 100% IF LEFT BLANK

YEAR	MONTH	OPERATOR	FIELD AREA	BATTERY	AMENDMENT YEAR	MONTH	DAY	CODE	PAGE
89	05	338		3200001					1 of 1

BATTERY NAME: ERCB EDSON GAS FACILITY NO. 1

CROWN ROYALTY

WELL NAME	BC	S	LE	UNIT	B	NTS MAP	P	ES	HORIZON / POOL / DEPOSIT	WGR TEST DATE YEAR	MONTH	DAY	WELL AUTHOR NUMBER	HOURS PRODUCED	NO. OF TESTS	CRUDE OIL / BITUMEN m^3	CONDENSATE m^3	GAS $10^3 m^3$	WATER m^3	CREDITS	PARTICIPATION INTEREST	PRODUCTION ALLOCATION m^3	ROYALTY m^3
ERCB EDSON 6-31-53-17	A/S	LE	LSD	SEC	TWP	RGE	W	M	P	ES											GAS			
	S	00	06	31	053	17	W	5	P	0	0326001	89	02	15		M	M				WATER			
	LOAD OIL INJECTED CR OIL / CR BIT ESTIMATE			LOAD OIL RECOVERED GAS ESTIMATE			LOAD OIL INVENTORY WATER ESTIMATE			WATER - GAS RATIO GAS - OIL RATIO			CYCLE NUMBER										
										0.01786				720				1603.6	29.7					
										28.6														
ERCB EDSON 7-20-53-17	A/S	LE	LSD	SEC	TWP	RGE	W	M	P	ES											GAS			
	S	00	07	20	053	17	W	5	P	0	0326001	89	02	15		M	M				WATER			
	LOAD OIL INJECTED CR OIL / CR BIT ESTIMATE			LOAD OIL RECOVERED GAS ESTIMATE			LOAD OIL INVENTORY WATER ESTIMATE			WATER - GAS RATIO GAS - OIL RATIO			CYCLE NUMBER										
										0.01015				720				1210.1	12.8					
										12.3														
ERCB EDSON 11-25-53-18	A/S	LE	LSD	SEC	TWP	RGE	W	M	P	ES											GAS			
	S	00	11	25	053	18	W	5	P	0	0326001	89	02	15		M	M				WATER			
	LOAD OIL INJECTED CR OIL / CR BIT ESTIMATE			LOAD OIL RECOVERED GAS ESTIMATE			LOAD OIL INVENTORY WATER ESTIMATE			WATER - GAS RATIO GAS - OIL RATIO			CYCLE NUMBER										
										0.01183				720				2109.9	25.9					
										25.0														
WELL NAME	BC	S	LE	UNIT	B	NTS MAP	P	ES	HORIZON / POOL / DEPOSIT	WGR TEST DATE YEAR	MONTH	DAY	WELL AUTHOR NUMBER	HOURS PRODUCED	NO. OF TESTS	CRUDE OIL / BITUMEN m^3	CONDENSATE m^3	GAS $10^3 m^3$	WATER m^3	CREDITS	PARTICIPATION INTEREST	PRODUCTION ALLOCATION m^3	ROYALTY m^3
	A/S	LE	LSD	SEC	TWP	RGE	W	M	P	ES											GAS			
	S						W		P						M	M					WATER			
	LOAD OIL INJECTED CR OIL / CR BIT ESTIMATE			LOAD OIL RECOVERED GAS ESTIMATE			LOAD OIL INVENTORY WATER ESTIMATE			WATER - GAS RATIO GAS - OIL RATIO			CYCLE NUMBER										
WELL NAME	BC	S	LE	UNIT	B	NTS MAP	P	ES	HORIZON / POOL / DEPOSIT	WGR TEST DATE YEAR	MONTH	DAY	WELL AUTHOR NUMBER	HOURS PRODUCED	NO. OF TESTS	CRUDE OIL / BITUMEN m^3	CONDENSATE m^3	GAS $10^3 m^3$	WATER m^3	CREDITS	PARTICIPATION INTEREST	PRODUCTION ALLOCATION m^3	ROYALTY m^3
	A/S	LE	LSD	SEC	TWP	RGE	W	M	P	ES											GAS			
	S						W		P						M	M					WATER			
	LOAD OIL INJECTED CR OIL / CR BIT ESTIMATE			LOAD OIL RECOVERED GAS ESTIMATE			LOAD OIL INVENTORY WATER ESTIMATE			WATER - GAS RATIO GAS - OIL RATIO			CYCLE NUMBER										

TOTAL CRUDE OIL/BITUMEN ESTIMATE	TOTAL GAS ESTIMATE	TOTAL WATER ESTIMATE	TOTAL OIL INJECTED	TOTAL OIL RECOVERED	TOTAL MEASURED PRODUCTION	TOTAL CREDITS	GAS ROYALTY RATE	TOTAL PRODUCTION ALLOCATION	TOTAL ROYALTY
	4930.8	65.9							
PRORATION FACTORS					TOTAL PRORATED PRODUCTION				
CRUDE OIL/BITUMEN	GAS	WATER			4923.6	68.4			
	0.99854	1.03794			TOTAL BATTERY PRODUCTION				

PLANT INLET GAS	4738.2
GAS EQUIVALENT OF CONDENSATE	134.0
GAS USED ON LEASE OR FLARED UPSTREAM OF PLANT INLET	54
	4923.6

CONTACT NAME: J. DOE — AREA: 403 — TELEPHONE: 297-8311

SIGNATURE: J. Smith — DATE: 9 JUNE 1989

Illustrative purposes only - these entries not required by the Board

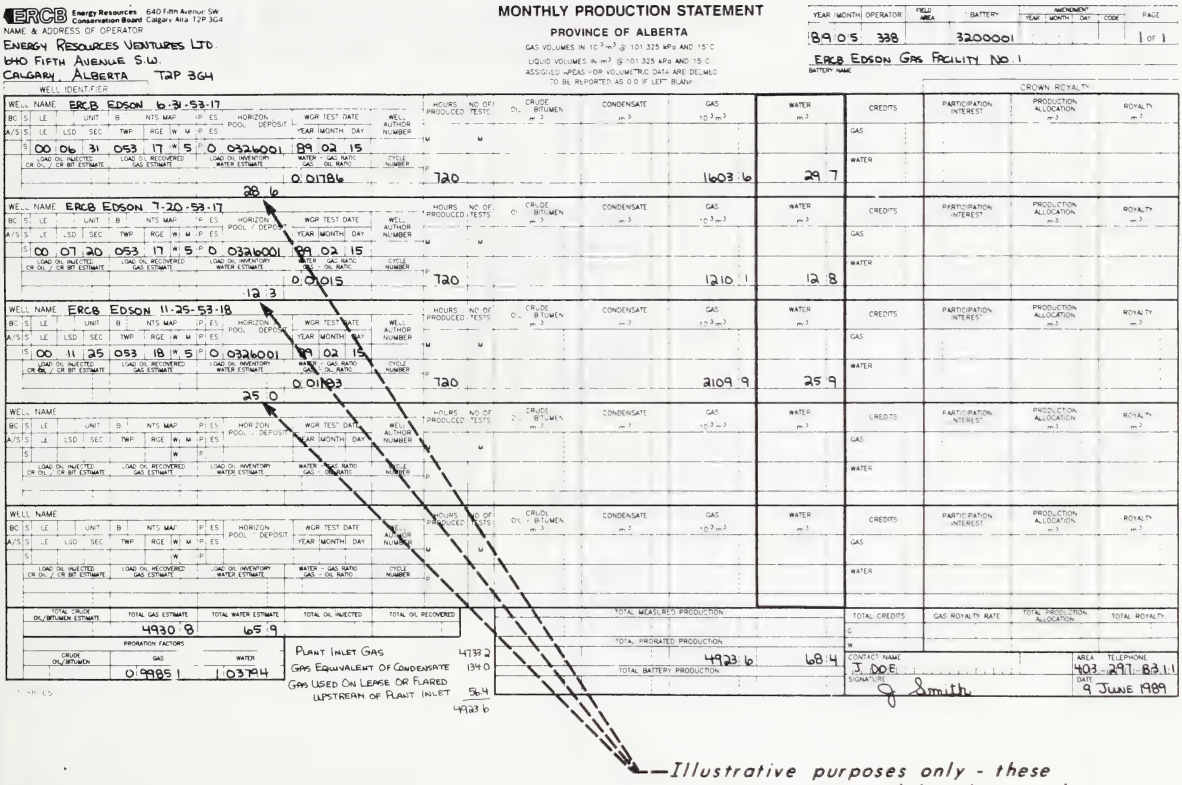
WELL PRODUCTION

WATER m^3	
use this area	

PRORATED WELL WATER PRODUCTION (m^3)
= WELL WATER ESTIMATE
x WATER PRORATION FACTOR

- round to 1 decimal place

WATER PRODUCTION CALCULATION EXAMPLE



ERCB Energy Resources Conservation Board, 640 Fifth Avenue SW, Calgary Alta T2P 3G4

NAME & ADDRESS OF OPERATOR

ENERGY RESOURCES VENTURES LTD.
640 FIFTH AVENUE S.W.
CALGARY, ALBERTA T2P 3G4

MONTHLY PRODUCTION STATEMENT

PROVINCE OF ALBERTA

GAS VOLUMES IN $10^3 m^3$ @ 101.325 kPa AND 15°C
LIQUID VOLUMES IN m^3 @ 101.325 kPa AND 15°C
ASSIGNED AREAS FOR VOLUMETRIC DATA ARE DELIMED TO BE REPORTED AS 0.0 IF LEFT BLANK

YEAR	MONTH	OPERATOR	FIELD AREA	BATTERY	AMENDMENT YEAR	AMENDMENT MONTH	AMENDMENT DAY	AMENDMENT CODE	PAGE
89	05	338		3200001					1 of 1

ERCB EDSON GAS FACILITY NO. 1
BATTERY NAME

WELL IDENTIFIER

WELL NAME	HOURS PRODUCED	NO. OF TESTS	CRUDE OIL - BITUMEN m^3	CONDENSATE m^3	GAS $10^3 m^3$	WATER m^3	CREDITS	PARTICIPATION INTEREST	CROWN ROYALTY: PRODUCTION ALLOCATION m^3	CROWN ROYALTY: ROYALTY m^3
ERCB EDSON 6-31-53-17										
BC S LE UNIT B NTS MAP P ES HORIZON POOL / DEPOSIT WGR TEST DATE YEAR MONTH DAY WELL AUTHOR NUMBER										
A/S S LE LSD SEC TWP RGE W M P ES										
S 00 06 31 053 17 W5 P 0 0326001 89 02 15										
LOAD OIL INJECTED OR OIL / OR BIT ESTIMATE: 0.01786 — LOAD OIL RECOVERED GAS ESTIMATE: 28.6 — LOAD OIL INVENTORY WATER ESTIMATE — WATER - GAS RATIO GAS - OIL RATIO — CYCLE NUMBER										
TP	720				1603.6	29.7	GAS / WATER			
WELL NAME ERCB EDSON 7-20-53-17										
BC S LE UNIT B NTS MAP P ES HORIZON POOL / DEPOSIT WGR TEST DATE YEAR MONTH DAY WELL AUTHOR NUMBER										
A/S S LE LSD SEC TWP RGE W M P ES										
S 00 07 20 053 17 W5 P 0 0326001 89 02 15										
LOAD OIL INJECTED OR OIL / OR BIT ESTIMATE: 0.01015 — LOAD OIL RECOVERED GAS ESTIMATE: 12.3 — LOAD OIL INVENTORY WATER ESTIMATE — WATER - GAS RATIO GAS - OIL RATIO — CYCLE NUMBER										
TP	720				1210.1	12.8	GAS / WATER			
WELL NAME ERCB EDSON 11-25-53-18										
BC S LE UNIT B NTS MAP P ES HORIZON POOL / DEPOSIT WGR TEST DATE YEAR MONTH DAY WELL AUTHOR NUMBER										
A/S S LE LSD SEC TWP RGE W M P ES										
S 00 11 25 053 18 W5 P 0 0326001 89 02 15										
LOAD OIL INJECTED OR OIL / OR BIT ESTIMATE: 0.01193 — LOAD OIL RECOVERED GAS ESTIMATE: 25.0 — LOAD OIL INVENTORY WATER ESTIMATE — WATER - GAS RATIO GAS - OIL RATIO — CYCLE NUMBER										
TP	720				2109.9	25.9	GAS / WATER			
WELL NAME										
BC S LE UNIT B NTS MAP P ES HORIZON POOL / DEPOSIT WGR TEST DATE YEAR MONTH DAY WELL AUTHOR NUMBER										
A/S S LE LSD SEC TWP RGE W M P ES										
S W P										
LOAD OIL INJECTED OR OIL / OR BIT ESTIMATE — LOAD OIL RECOVERED GAS ESTIMATE — LOAD OIL INVENTORY WATER ESTIMATE — WATER - GAS RATIO GAS - OIL RATIO — CYCLE NUMBER										
TP							GAS / WATER			
WELL NAME										
BC S LE UNIT B NTS MAP P ES HORIZON POOL / DEPOSIT WGR TEST DATE YEAR MONTH DAY WELL AUTHOR NUMBER										
A/S S LE LSD SEC TWP RGE W M P ES										
S W P										
LOAD OIL INJECTED OR OIL / OR BIT ESTIMATE — LOAD OIL RECOVERED GAS ESTIMATE — LOAD OIL INVENTORY WATER ESTIMATE — WATER - GAS RATIO GAS - OIL RATIO — CYCLE NUMBER										
TP							GAS / WATER			

TOTAL CRUDE OIL/BITUMEN ESTIMATE	TOTAL GAS ESTIMATE	TOTAL WATER ESTIMATE	TOTAL OIL INJECTED	TOTAL OIL RECOVERED
	4930.8	65.9		

PRORATION FACTORS

CRUDE OIL/BITUMEN	GAS	WATER
	0.99851	1.03794

PLANT INLET GAS	4733.2
GAS EQUIVALENT OF CONDENSATE	134.0
GAS USED ON LEASE OR FLARED UPSTREAM OF PLANT INLET	56.4
	4923.6

TOTAL MEASURED PRODUCTION		
TOTAL PRORATED PRODUCTION	4923.6	68.4
TOTAL BATTERY PRODUCTION		

TOTAL CREDITS	GAS ROYALTY RATE	TOTAL PRODUCTION ALLOCATION	TOTAL ROYALTY
G			
W			

CONTACT NAME: J. DOE — AREA 403 — TELEPHONE 297-8311
SIGNATURE: J Smith — DATE: 9 JUNE 1989

Illustrative purposes only - these entries not required by the Board

Case 1

Well gas production must first be calculated and entered according to a method described in Section 110 of this chapter.

WATER - GAS RATIO GAS - OIL RATIO
use this area

WATER OF CONDENSATION ONLY.

The water-gas ratio is to be calculated by the method described in ERCB Guide G-4, Determining Water Production at Gas Wells.

- calculate to 6 decimal places, then round to 5

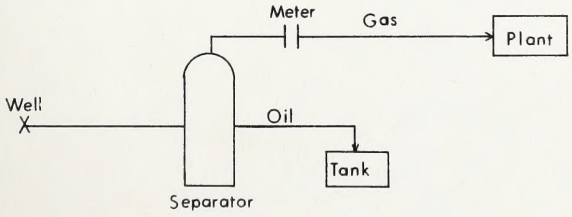
Well water production
= water-gas ratio
x well gas production

Enter water production adjacent to gas production (same line).

WGR TEST DATE		
YEAR	MONTH	DAY

If wells are not production tested, the date of the last water analysis must be entered as the test date for each well.

These analyses are to be updated every 6 months.



OIL PRODUCTION EXAMPLE

ERCB Energy Resources Conservation Board 640 Fifth Avenue SW Calgary Alta T2P 3G4

NAME & ADDRESS OF OPERATOR
ENERGY RESOURCES VENTURES LTD.
640 FIFTH AVENUE S.W.
CALGARY, ALBERTA T2P 3G4

MONTHLY PRODUCTION STATEMENT

PROVINCE OF ALBERTA

GAS VOLUMES IN $10^3 m^3$ @ 101.325 kPa AND 15°C
LIQUID VOLUMES IN m^3 @ 101.325 kPa AND 15°C
ASSIGNED AREAS FOR VOLUMETRIC DATA ARE DEEMED TO BE REPORTED AS 0.0 IF LEFT BLANK

YEAR	MONTH	OPERATOR	FIELD / AREA	BATTERY	AMENDMENT YEAR	AMENDMENT MONTH	AMENDMENT DAY	AMENDMENT CODE	PAGE
89	05	338		9350001					1 OF 1

BATTERY NAME: ERCB WAYNE ROSEDALE 6-34-27-18

WELL IDENTIFIER

WELL NAME	BC / A/S	S	LE	LSD	SEC	TWP	RGE	W	M	P	ES	HORIZON / POOL / DEPOSIT	WGR TEST DATE YEAR	MONTH	DAY	WELL AUTHOR NUMBER	HOURS PRODUCED	NO OF TESTS
ERCB WAYNE ROSEDALE 6-34-27-18		S	00	06	34	027	18	W	4	P	0	0334025	89	02	15		M 736	M
		S						W		P							M	M
		S						W		P							M	M
		S						W		P							M	M
		S						W		P							M	M

WELL	LOAD OIL INJECTED CR OIL / CR BIT ESTIMATE	LOAD OIL RECOVERED GAS ESTIMATE	LOAD OIL INVENTORY WATER ESTIMATE	WATER - GAS RATIO GAS - OIL RATIO	CYCLE NUMBER
ERCB WAYNE ROSEDALE 6-34-27-18				0.01343	

WELL	CRUDE OIL / BITUMEN m^3	CONDENSATE m^3	GAS $10^3 m^3$	WATER m^3	CREDITS	CROWN ROYALTY PARTICIPATION INTEREST	PRODUCTION ALLOCATION m^3	ROYALTY m^3
ERCB WAYNE ROSEDALE 6-34-27-18	13.5		238.2	3.2	GAS WATER			
					GAS WATER			
					GAS WATER			
					GAS WATER			
					GAS WATER			

TOTAL CRUDE OIL/BITUMEN ESTIMATE	TOTAL GAS ESTIMATE	TOTAL WATER ESTIMATE	TOTAL OIL INJECTED	TOTAL OIL RECOVERED

PRORATION FACTORS

CRUDE OIL/BITUMEN	GAS	WATER

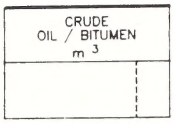
	CRUDE OIL / BITUMEN	CONDENSATE	GAS	WATER
TOTAL MEASURED PRODUCTION	13.5		238.2	3.2
TOTAL PRORATED PRODUCTION				
TOTAL BATTERY PRODUCTION				

	TOTAL CREDITS	GAS ROYALTY RATE	TOTAL PRODUCTION ALLOCATION	TOTAL ROYALTY
G				
W				

CONTACT NAME: J DOE
AREA TELEPHONE: 403-297-8311
SIGNATURE: J Smith
DATE: 9 JUNE 1989

S 1 88 05

Gas production equals metered gas plus an estimate of tank vapours ; no free water production.



CUBIC METRES (m^3) OF OIL PRODUCED BY WELL DURING MONTH.

- measured volume; do not prorate oil to wells

- round to 1 decimal place